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BULLETIN  
OF THE  
TORREY BOTANICAL CLUB

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MARCH, 1917.

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A revision of the genus *Polygonatum* in North America

R. R. GATES

(WITH PLATES 4-6)

This genus has been in a very chaotic condition owing to the "lumping" of species, the transference of names, and the confusion of North American with European species. The whole genus contains probably not less than fifty species, the majority of which are European or Asiatic. There has been a marked tendency to form aggregate species of the European forms, so that they too are in need of a critical revision and comparison with North American forms. Not until then will it be possible to determine the closeness of the relationship, though it appears at present that none of the North American species agree with European forms.

The North American forms have been divided by Farwell into two groups, the *Pubescentes* and the *Glabrata*, corresponding respectively to the species which have hitherto been erroneously going under the names *P. biflorum* and *P. commutatum* and which were supposed to comprise all American forms. It may be pointed out that the European alternate-leaved species are also some of them glabrous and some pubescent.

The number of species here recognized is nine, including three, *P. hirtum*, *P. canaliculatum*, and *P. parviflorum*, which are only known from early descriptions. The remaining species show much puzzling variation, so that a number of varieties are recognized, and the limits of variation of several of the species are by no

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means clear at the present time. The only form which appears to be a possible mutation is *P. giganteum*. The interpretation of the origin and relationships of the other species and varieties will have to await a more detailed knowledge of their characters, variation and distribution.

The Euro-Asian members of the genus *Polygonatum*, however, furnish a series of species, such as *P. verticillatum* All. and *P. Haussknechtii* Bornm. & Sint., which agree in having their leaves in whorls, rather than alternate as in American species or opposite as in some European species. This verticillate condition probably did not come about gradually, and must have appeared as a mutation by a single step. Whether this mutation occurred but once, all verticillate species having then descended from a common stock, cannot be debated at the present time, but this is by no means necessarily the case. The fact of parallel mutations of course complicates all interpretations of phylogenetic possibilities.

Unless otherwise stated the specimens cited below are in the herbarium of the Missouri Botanical Garden. The abbreviation "Cal." signifies the herbarium of the University of California.

#### I. POLYGONATUM PUBESCENS (Willd.) Pursh

*Convallaria pubescens* Willd. Hort. Berol. 45. *pl.* 45. 1805.

*Polygonatum pubescens* Pursh, Fl. Am. Sept. 234. 1814; Farwell, Bull. Torrey Club 42: 253. *pl.* 13A. 1915.

*Polygonatum multiflorum*  $\beta$  *americanum* Hook. Fl. Bor. Amer. 2: 176. 1840 (in part).

*Polygonatum biflorum* Ell.; A. Gray, Manual, Ed. 2, 466. 1856.

*Salomonina biflora* Farwell, Rep. Com. Parks Detroit 11: 53. 1900.

*Polygonatum boreale* Greene, Leaflets 1: 181. 1906. Farwell, Bull. Torrey Club 42: 253. *pl.* 14A. 1915.

Known from Massachusetts south to Carolina and west to Wisconsin, Michigan and Indiana. The bounds probably extend beyond these limits.

MASSACHUSETTS: Oak Island, May 23, 1897, *J. M. Greenman* 2284; Stony Brook, May 15, 1897, *J. M. Greenman* 2288; Provincetown, May 22, 1904, *J. M. Greenman* 3013. CONNECTICUT: Norwich, May 25, 1883, *W. A. Setchell* (Cal.); Waterbury, June 1,

1888, *Constance G. Dubois* (Cal.). NEW JERSEY: Greenwood Lake, Passaic County, May 19, 1907, *K. K. Mackenzie* 2574; Somerset County, *R. C. Perry*. PENNSYLVANIA: Mountville, May, 1889, *A. F. Eby*. VIRGINIA: Hungry Hollow, northeast of Marion, Smyth County, May 24, 1892, *John K. Small* (Cal.). INDIANA: Harrison Township (Section 30), Wells County, May 14, 1905, *Charles C. Deam* (specimen verging toward var. *cuneatum*); North Lapaz Junction, Marshall County, May 18, 1913, *J. A. Nieuwland* 11035. WISCONSIN: Ephraim, June 5, 1907, *J. M. Greenman* 2167; Appleton, May 15, 1896, *H. P. Chandler* (Cal.). MINNESOTA: Minneapolis, June, 1890, *J. H. Sandberg*.

Farwell has endeavored to separate *P. boreale* Greene from *P. pubescens* on the basis of the somewhat larger and more elliptical leaves of the former, but the variation between them is apparently continuous. Moreover, the two specimens cited above from Greenwood Lake, New Jersey, and Ephraim, Wisconsin, are exactly alike and correspond with the measurements given by Farwell for *P. boreale*. Hence, in the presence of intermediates, both cannot be recognized since they have the same range.

1a. *POLYGONATUM PUBESCENS CUNEATUM* (Greene) Farwell

*Polygonatum cuneatum* Greene, Leaflets 1: 181. 1906.

*Polygonatum pubescens cuneatum* Farwell, Bull. Torrey Club 42: 253. pl. 13, B. 1915.

Described by Greene from near Turin, Marquette County, Michigan. According to Farwell it differs from *P. pubescens* only in having longer and relatively narrower leaves cuneate at the base. Known from Michigan to Pennsylvania and Connecticut.

CONNECTICUT: Berlin, 1870, *T. S. Brandegee* (Cal. 119680). PENNSYLVANIA: Bellwood, Blair County, May 18, 1904, *O. E. Jennings* (Cal. 69244). In these two specimens the leaves are 20–25 mm. wide  $\times$  6–9 cm. long, the flowers small, greenish, 8–10 mm. long.

1b. *Polygonatum pubescens australe* (Farwell) comb. nov.

*Polygonatum boreale australe* Farwell, Bull. Torrey Club 42: 254. pl. 14, B. 1915.

Known only from Detroit, Michigan, and the following locality:

MASSACHUSETTS: Purgatory Swamp, Westwood, May 14, 1904, A. H. Moore (Cal. 158495). The specimen here cited and photographed (PLATE 4, A) agrees with Farwell's description except that the peduncles are mostly two-flowered. This form is decidedly smaller and more slender than var. *cuneatum*, but may perhaps be connected with it by intermediates. The dimensions of the specimens studied are as follows: stem 1.5–2.5 mm. in diameter, rootstock 4–5 mm. in diameter, leaves pubescent and glaucous below, elliptical, 4.5–6 cm. long, 14–22 mm. wide.

## 2. POLYGONATUM HIRTUM (Bosc) Pursh

*Convallaria hirta* Bosc; Poiret, Encyc. 4: 369. 1796.

*Polygonatum hirtum* Pursh, Fl. Am. Sept. 234. 1814.

This species is unknown at the present time, but there should be no difficulty in identifying it from Poiret's description and the specimens in Paris. It is evidently most nearly related to *P. pubescens*, with which it agrees in having pubescence along the nerves on the ventral surface of the leaves, but from which it differs in that the stem and peduncles are also pubescent. The leaves are described as sessile, nearly amplexicaul, oval, large, ending in a long, obtuse point. The peduncles are said to be an inch long and two- or three-flowered. The size of the flowers can only be determined by examination of the specimens at the Museum d'Histoire Naturelle in Paris. Crevecoeur brought the species from North America to the Jardin des Plantes in 1789.

## 3. POLYGONATUM BIFLORUM (Walt.) Ell.

*Convallaria biflora* Walt. Fl. Car. 122. 1788.

*Polygonatum angustifolium* Pursh, Fl. Am. Sept. 234. 1814.

*Polygonatum biflorum* Ell. Bot. S. C. & Ga. 1: 393. 1817.

*Convallaria angustifolia* Schult. Syst. 7: 301. 1829.

*Polygonatum multiflorum*  $\beta$  *americanum* Hook. Fl. Bor. Am. 2: 176. 1840 (in part).

Carolina to Pennsylvania.

This species occurs on the Atlantic coast, but its full range is at present unknown. Since the second edition of Gray's Manual, in which *P. pubescens* and other forms were merged with it, *P. biflorum* has been an inclusive species, supposed to range north-

ward to New Brunswick and westward to Kansas and Texas. The precise characters of Walter's *P. biflorum* are difficult of determination. Farwell (*l. c.*, *pl.* 15, *A*) published a figure of what he believed to be the type of the species, from a specimen collected in Franklin, New Jersey, by H. H. Rusby. I have examined specimens the exact counterpart of this. It is a fairly constant form and I have described it below as *P. biflorum hebetifolium*. It cannot represent Walter's type because that calls for a three-nerved leaf.

What I believe to be the type of Walter's *Convallaria biflora* is represented by a suite of six sheets of specimens, all very uniform, from the Chapman herbarium in the herbarium of the Missouri Botanical Garden. Unfortunately these are without locality, but they doubtless came from somewhere in the southeastern states, probably North Carolina. One of the sheets is represented in PLATE 4, B, and a description of the specimens follows:

Plant glabrous, 2–5 dm. high, naked portion of stem usually shorter than leafy portion. Leaves seven to ten, secund, narrowly elliptic-lanceolate, tapering gradually to a long, narrow point, more acute than in any other American *Polygonatum*, 7–12 cm. long, 8–17 mm. wide, with three to seven more or less prominent nerves, tapering gradually to a semiamplexicaul or sessile base. Peduncles slender (less than 0.5 mm. in diameter) 2–3 cm. in length, bearing one or two flowers on short pedicels 4–6 mm. in length. Flowers yellowish, about 2 cm. long and 3–5 mm. in diameter.

A specimen collected by *C. W. Eisenhower* at Conewago Creek, Pennsylvania, in May, 1898, agrees with the type except that it has somewhat broader leaves (15–21 mm. wide).

### 3a. *Polygonatum biflorum hebetifolium* var. nov.

A specie differt foliis latoribus et obtusioribus (7–10 cm. longis, 13–26 mm. latis), sine nervis manifestis aut solum nervo medio indicato; floribus minoribus, albidis (7–15 mm. longis), frequenter binis, pedicellis usque ad 1 cm. longis.

NEW YORK: Princes Bay, Staten Island, May 25, 1889, *N. L. Britton* (Cal.). NEW JERSEY: Snake Hill, near Hoboken, June 2, 1884, *H. von Schrenk*. PENNSYLVANIA: Mountville, July, 1888, *A. F. Eby*; Mt. Alto, 1909, *Joseph Illick* (flowers 14 mm. long); York County, June 3, 1895, *N. M. Glatfelder* (no flowers);

York County, June 3, 1895, *S. Williams* (no flowers). DISTRICT OF COLUMBIA: Washington, 188—, *L. F. Ward* (Cal.). KENTUCKY: Louisville, 1835, *C. W. Short* (flowers 15 mm. long); Bowling Green, May 29, 1899, *Sadie F. Price*. NORTH CAROLINA: locality, date, and collector's name unknown (specimen in the Chapman herbarium, type). MISSOURI: Watson, June 1, 1894, *B. F. Bush* 527.

One sheet in the Chapman herbarium contains one specimen of typical *P. biflorum* and one of the variety (PLATE 5, A). Hence no doubt they both occur in the same locality. The variety extends as far west as Missouri and its flowers vary somewhat in size, the leaves also showing some variation in relative width and in obtuseness. Indeed I have included a considerable range of forms which may ultimately have to be separated. While in the type specimen the flowers are small and the leaves scattered on the stem, in the Missouri form (PLATE 5, B) the flowers are much larger (18 mm.) and the leaves rather crowded on the stem. A majority of the specimens cited correspond rather more nearly with the latter condition than with the former.

#### 4. POLYGONATUM CANALICULATUM (Muhl.) Pursh

*Convallaria canaliculata* Muhl.; Willdenow, Hort. Berol. 45. 1805.  
*Polygonatum canaliculatum* Pursh, Fl. Am. Sept. 234. 1814.

This North American species was described as follows:

Foliis alternis amplexicaulibus oblongis margine pubescentibus, caule canaliculato, pedunculis bifloris axillaribus. Differt a *Convallaria pubescenti*; foliis oblongis glabris margine tantum tenuissime pubescentibus, corolla magnitudine et facie *Convallariae Polygonati*.

*C. multiflora* Michx. (Fl. Bor. Am. 1: 202. 1805) is given as a synonym, from which it may be inferred that the distribution "Pennsylvania to Virginia" given by Michaux applies to *P. canaliculatum*. Although the name *P. canaliculatum* has since been used in various senses, yet the pubescent leaf-margins prevent its identification with any species at present known. Its exact characters should be determined from the original specimens and the careful description given by Schultes (Syst. 7: 1670. 1830).

#### 5. POLYGONATUM COMMUTATUM (J. A. & J. H. Schult.) Dietr.

*Convallaria commutatum* J. A. & J. H. Schult. Syst. 7: 1671. 1830.

*Polygonatum commutatum* Dietr.; Otto & Dietr. Gartenz. 3: 223. 1835.

*Polygonatum multiflorum*  $\beta$  *americanum* Hook. Fl. Bor. Am. 2: 176. 1840 (in part).

*Polygonatum latifolium* var. *commutatum* Baker, Jour. Linn. Soc. Bot. 14: 555. 1875.

*Polygonatum biflorum commutatum* Morong, Mem. Torrey Club 5: 115. 1894.

*Salomonina commutata* Britton, Man. 273. 1901.

Georgia to Pennsylvania, Wisconsin, South Dakota and Oklahoma, probably extending north into Canada.

This appears to be the most widely distributed of all the species. It varies considerably within the range indicated, and other segregates may be detached from it later. The following specimens in the herbarium of the Missouri Botanical Garden are here referred to it:

PENNSYLVANIA: Conewago, May, 1889, *J. H. Eby*; George School woods, June 2, 1906, *Elma M. Eves*. GEORGIA: cliffs of the Coosa River, Rome, 1872, *A. W. Chapman* 3886, 3917. TENNESSEE: Knoxville, April and May, 1898, *Albert Ruth* 148, 781 (the latter specimen intermediate between *P. commutatum* and *P. biflorum hebetifolium*, leaves  $38 \times 12$  cm.). WISCONSIN: Mirror Lake, Sauck County, July 13, 1903, *H. Eggert*. IOWA: Iowa City, *A. S. Hitchcock*. MISSOURI: St. Louis, June, 1892, *H. Eggert*; Iasco, August 20, 1911, *John Davis* 987. SOUTH DAKOTA: Vermillion, May 22, 1911, *S. S. Vischer* 4018; Oakwood, *Thomas A. Williams*; Oakwood, May 23, 1902, *A. G. Johnson*. NEBRASKA: Nuckolls County, August, 1899, *George C. Hedgcock* (three sheets); southwest of Lincoln, June 5, 1900, *George C. Hedgcock*; South Bend, May 12, 1900, *George C. Hedgcock*. KANSAS: Cowley County, June, 1898, *Mark White*; Riley County, 1896, *J. B. Norton* 834; Fort Riley, Geary County, July 2, 1895, *C. H. Thompson*. OKLAHOMA: Sapulpa, July 27, 1894, *B. F. Bush* 578 ("uncommon").

5a. *Polygonatum commutatum virginicum* (Greene) comb. nov.

*Polygonatum virginicum* Greene, Leaflets 1: 181. 1906.

*Polygonatum biflorum virginicum* Farwell, Bull. Torrey Club 42: 254. pl. 15, B. 1915.



This variety (PLATE 6, A) is evidently closely related to the typical form of *P. commutatum*, from which it differs chiefly in having elliptical leaves, not amplexicaul, dark green in color, and more slender peduncles. Farwell's illustration represents a form of *P. commutatum*.

VIRGINIA: bluffs of the middle fork of the Holston River, near Marion, Smyth County, May 22, 1892, *John K. Small* (Cal. 3835, co-type of *P. virginicum*). DISTRICT OF COLUMBIA: Dalecarlia Reservoir, May 23, 1905, *Joseph H. Painter* 1309.

5b. *Polygonatum commutatum ovatum* (Farwell) comb. nov.

*Polygonatum biflorum ovatum* Farwell, Bull. Torrey Club 42: 255. pl. 16, A. 1915.

Michigan to Iowa, Nebraska and Oklahoma.

This variety as here understood differs from the species chiefly in having leaves which are amplexicaul, usually rather broadly ovate with very blunt tips, peduncles stout and flattened, flowers frequently in 3's and 4's, about 18 mm. in length. It is clearly related to *P. commutatum* rather than *P. biflorum*.

IOWA: Shelby County, May 30, 1894, *T. J. & M. F. L. Fitzpatrick*; Grinnell, 1886, *H. W. Norris*. NEBRASKA: near Lincoln, June 5, 1900, *George C. Hedgcock*. OKLAHOMA: Catoosa, May 14, 1895, *B. F. Bush* 1282 ("common").

6. *POLYGONATUM GIGANTEUM* Dietr.

*Polygonatum giganteum* Dietr.; Otto & Dietr. Gartenz. 3: 222. 1835.

*Polygonatum multiflorum*  $\beta$  *americanum* Hook. Fl. Bor. Am. 2: 176. 1840 (in part).

*Polygonatum biflorum*  $\gamma$  *giganteum* Wood. Bot. & Flo. 346. 1870.

*Polygonatum canaliculatum giganteum* Farwell, Bull. Torrey Club 42: 256. pl. 18. 1915.

Maryland and Pennsylvania to Wisconsin and Montana, south to Nebraska, Missouri and Kentucky.

This species was originally described by Dietrich from specimens received from the Edinburgh Botanic Garden, the superintendent's son having obtained it from North America. It appears to be essentially a giant derivative of *P. commutatum*, yet its characters are sufficiently distinct to be amply worthy of

specific rank. The following specimens, while conforming in general to Dietrich's description, vary somewhat in leaf-shape, length of peduncles, number of flowers, etc., sometimes much exceeding the measurements of the original description. In that description the plants were 3 feet high, though they attained a height of  $7\frac{1}{2}$  ft. in the Edinburgh Garden; the peduncles 6-8 lines long, bearing 3-4 flowers on pedicels 4-6 lines long; the leaves oval, glaucous beneath. In the specimens of *P. giganteum* examined, the stem in one case attained a diameter of 2 cm., the (flat) peduncles a length of 11 cm. (bearing as many as nine flowers), the leaves a size of  $19 \times 10$  cm. Most of the specimens were, however, much smaller, though usually larger and with more numerous pedicels than in Dietrich's material. Farwell's specimens (*pl. 18*) from Michigan have smaller flowers (14-16 mm.).

PENNSYLVANIA: Crum Creek near Philadelphia, June 7, 1870, *J. H. Redfield 8187*. DISTRICT OF COLUMBIA: Washington, June 12, 1878, *J. W. Chickering, Jr.* OHIO: Springfield, *M. G. Williams*. ILLINOIS: woody bluffs southeast of East Carondelet, September 4, 1891, *E. Douglas*. WISCONSIN: Racine, September 11, 1879, *J. J. Davis*; Kilbourn, August 15, 1892, *Mrs. Wallace* (leaves  $14 \times 7.5$  cm., broadly elliptical, very obtuse). KENTUCKY: Bowling Green, June, 1899, *Sadie F. Price*. MISSOURI: Woodlawn, September 19, 1878, *G. Engelmann*; Hannibal, May, 1906, *John Davis 12001*; St. Louis, July or August, 1891, collector unnamed. NEBRASKA: Sargent's Hill, June, 1853, *F. V. Hayden*; St. Helena, *T. A. Bruhin*; Lincoln, August, 1889, *H. J. Webber*. Also the following: "A. A. M.," June, 1858 (Herb. Fritchey); "from Niobrarah River to Fort Pierre, June, 1859, *F. V. Hayden* (Reynold's Expedition to the headwaters of the Missouri and Yellowstone Rivers).

#### 7. POLYGONATUM PARVIFLORUM (Poir.) Dietr.

*Convallaria parviflora* Poir. Encyc. Suppl. 4: 29. 1816.

*Polygonatum parviflorum* Dietr.; Otto & Dietr. Gartenz. 3: 222. 1835.

This species is unidentified. Its description is as follows:

C. foliis subsessilibus, ovato-oblongis, glabris; pedunculis axillaribus bi-raro trifloris minimis.

The flowers are further said to be small, white, half as large as

in *C. Polygonatum*. The exact features of this plant can only be determined by examination of the original specimen in the Desfontaine herbarium, in Paris.

8. ***Polygonatum cobrensis*** (Wooton & Standley) comb. nov.

*Salomonina cobrensis* Wooton & Standley, Contrib. U. S. Nat. Herb. 16: 113. 1913.

New Mexico.

Through the kindness of Mr. William R. Maxon of the National Herbarium I have been able to examine the type specimen, which came from Copper Mines, Santa Rita, New Mexico. The following specimen (PLATE 6, B), in the herbarium of the Missouri Botanical Garden, came from a neighboring locality and shows still better the features of this species: Pinos Altos Mountains, New Mexico, *E. L. Greene*, May 21, 1880. Dr. Greene referred this specimen to the European *P. vulgare* Desf. which it evidently resembles, though I have seen no specimens of the latter which approach it very closely. A critical comparison should be made with European specimens. The species most resembles *P. biflorum hebetifolium*.

9. **POLYGONATUM ELLIPTICUM** Farwell

*Polygonatum ellipticum* Farwell, Bull. Torrey Club 42: 255. pl. 16, B. 1915.

This species was based on material collected by its author at Rochester, Michigan, in June, 1914. Since I have seen no specimens I am unable to judge of its status.

**Explanation of plates 4-6**

PLATE 4

A. *Polygonatum pubescens australe* (Farwell) Gates. Photograph of a specimen from Purgatory Swamp, Westwood, Massachusetts, *A. H. Moore*. B. *Polygonatum biflorum* (Walt.) Ell. Photograph of a specimen in the Chapman herbarium, presumably representing the type of *Convallaria biflora* Walt.

PLATE 5

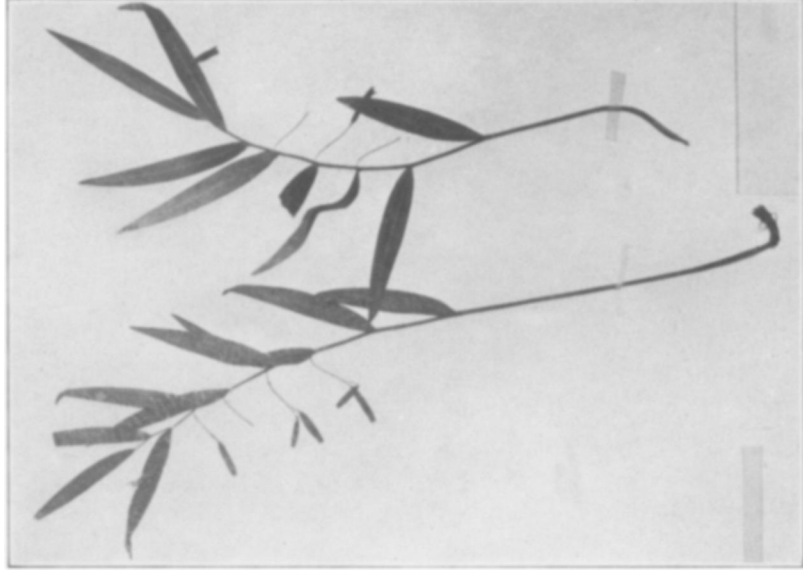
*Polygonatum biflorum hebetifolium* Gates. A. Photograph of a type specimen. B. Photograph of a specimen from Watson, Missouri, *B. F. Bush* 527.

PLATE 6

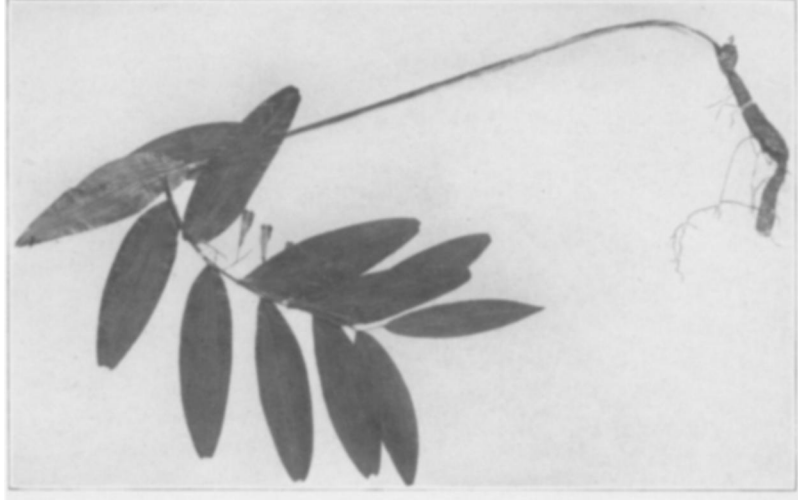
A. *Polygonatum commutatum virginicum* (Greene) Gates. Photograph of a co-type specimen of *P. virginicum* Greene. B. *Polygonatum cobrensis* (Wooton & Standley) Gates. Photograph of a specimen collected in the Pinos Altos Mountains, New Mexico, *E. L. Greene*.



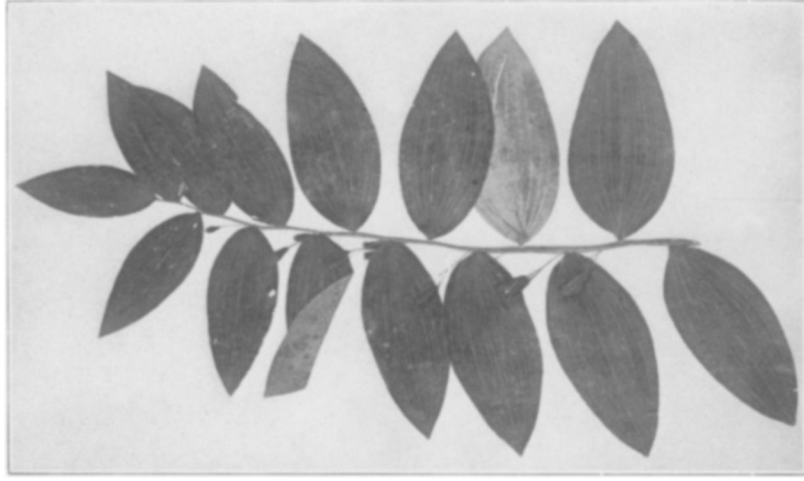
A. *POLYGONATUM PUBESCENS AUSTRALE*  
(FARWELL) GATES



B. *POLYGONATUM BIFLORUM* (WALT.) ELL.



POLYGONATUM BIFLORUM HEBETIFOLIUM GATES



A. *POLYGONATUM COMMUTATUM VIRGINICUM* (GREENE) GATES



B. *POLYGONATUM COBRENSIS*  
(WOOTON & STANDLEY) GATES